use an appliance more frequently or at a greater capacity than average, and thus, require

service at an earlier date or even a different type of service than what is recommended for

average use. In addition, environmental conditions such as water hardness, humidity, air

flow and so forth may adversely affect the operations of a given appliance. The appliances

or components thereof may therefore require replacing or cleaning at an earlier date than rec-

ommended by the manufacturer. Accordingly, when the user [when] requests the recom-

mended service may not be arranging for service at the appropriate time. Conversely, if the

appliance use is well below average or the environment is particularly well suited to the ap-

pliance, the user who requests the recommended service may be arranging, and thus paying

for unneeded service.

Please amend paragraph 2, page 7, beginning at line 8 as set forth below:

The communications path 40 between the appliances [14-20] 14, 16, 18 and 20 and

the gateway 42 may be over a power line, a dedicated line, a telephone link or a wireless link.

The gateway, which includes a modem, may be included in one of the appliances or may be,

as shown in the drawing, a separate node on the network 10. The monitoring subsystem 30

may be one of two types, namely, a built-in system 32 that is incorporated into an "intelli-

gent" appliance or an adapter 34 that attaches to a "non-intelligent" appliance.

Please amend paragraph 1, page 11 beginning at line 1 as set forth below:

The monitoring subsystem 32 further includes a ROM 226 that contains the software

that controls the operations of the processor 33. The ROM 226 may instead be any form of

non-volatile memory such as an EE PROM. Under software control, the RAM 224 receives

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functional data from the sensors over the bus 222 (step 300), and the processor 33 then

analyses certain of the data (step 302), to determine parameter values such as the start times

and duration of the duty cycles of the compressor and the evaporator, the current drawn when

the compressor and evaporator are turned on, the times the door opens and closes, the associ-

ated internal and ambient temperatures, the user-selected temperature settings, and so forth.

As part of the analysis, the processor aggregates the data and calculated parameter values

from several operating cycles into historical data that the system stores in the RAM 224. The

subsystem may also compare the data and calculated parameter values from the most recent

operating cycle to the historical data and/or to expected data values, to determine if the appli-

ance is operating properly (step 304). If the subsystem determines that the appliance is func-

tioning properly, the subsystem sends the data to the gateway (step 305). If the subsystem

determines that the appliance is not functioning properly, the subsystem performs further

steps to determine the need for warning messages and so forth as discussed below. Alterna-

tively, the subsystem sends the data to the remote center, which performs all or part of the

analysis.

Please amend the first full paragraph on page 12, beginning at line 6 as set forth be-

low:

The analysis performed by the monitoring subsystem 32 may also reveal that the as-

sociated appliance requires immediate attention from the user (step 314). The subsystem

monitoring the refrigerator may, for example, determine that the door [204] 212 has been left

open longer than a predetermined maximum time limit. The subsystem first sets off a local

alarm in an attempt to alert the user. The subsystem thus causes the refrigerated compart-

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ment light 210 to blink and, as appropriate, buzzers (not shown) to sound. Further, the subsystem sends a local alarm message over the network to the gateway 42 and the various other appliances in the household. In response the gateway and the other subsystems and adapters blink indicator lights and/or sound buzzers in a predetermined pattern to alert the user of the condition. The user may respond to the alarm by shutting the refrigerator door. The subsystem then sends a message over the network instructing the gateway and other appliances to turn off the local alarm.

Please amend paragraph 2, page 12, beginning at line 18 as set forth below:

If the user does not acknowledge the local alarm within a predetermined time by, for example, shutting the refrigerator door or otherwise deactivating the associated alarm, the subsystem sends an alarm message to the remote center. The subsystem also sets the corresponding flag to signify that the open-door message was sent (steps 308, 310, 312), such that the condition is not repeatedly reported as the subsystem continues to collect and analyse the data (step 309). As appropriate, the subsystem sends a message to the other appliances instructing them to turn off the local alarm.

Please insert a new paragraph after the last paragraph on page 12 as set forth below:

If immediate user attention is not required, the subsystem may further analyse the data (step 315), to determine if a warning message is required, as discussed below with reference to Fig. 4.

Please amend paragraph 2, page 13, beginning at line 12 as set forth below:

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The monitoring subsystem 32 for the washing machine 18 receives the functional data from the sensors over the bus 222, and analyses certain of the data to determine whether the washing machine is operating properly. The monitoring subsystem 32 thus compares the sensor data associated with the most recent operating cycle with expected values and/or values from past cycles to determine if the washing machine is in danger of imminent failure. In the example, the subsystem compares the values associated with the current duty cycle of the motor [110] 108 with those associated past or expected duty cycles, taking into account the water level and when the door [112] 110 was opened or closed.

Please amend the first full paragraph on page 14, beginning on line 5 as set forth below:

Referring now also to Fig. 4, the analysis performed by the subsystem may also reveal that a critical component is operating poorly but not in danger of imminent failure (step 400). The refrigerator's monitoring subsystem may determine, for example, that the compressor is drawing increasing amounts of current but has not yet drawn an amount that exceeds a level associated with imminent failure. The subsystem 32 checks that the condition has not yet been reported and, as appropriate, sends a warning message that contains a fault code which indicates that the particular compressor requires non-emergency service (steps 402, 404). The subsystem similarly sends a warning message if the statistical data indicates that a preventative maintenance milestone, such as a number of cycles performed, has been achieved. The warning message may, for example, include a maintenance code that indicates that a particular filter should be replaced. After sending the message, the subsystem 32 sets

the associated flags, to avoid the sending of duplicate warning messages during a subsequent operating cycle (step [403] 406).

Please amend paragraph 1, page 16, beginning on line 1 as set forth below:

Based on the results of the analysis, the adapter 34 produces appropriate alarm and warning messages if the appliance is not properly functioning (steps [506-512] 504, 506, 508, 509, 510, 512, 504, 515). Otherwise, the adapter 34 sends the data to the gateway (step 505).

While the adapter may have access to less overall functional data than the built-in subsystem 32, the data available to the adapter is generally sufficient to determine when the associated appliance is operating poorly or when certain key components have failed. The adapter may not, however, be able to determine the causes of the malfunctions. The adapter also produces historical and statistical data, in the form of various data points from plots of associated energy consumption variables versus time, and sends the data to the remote center for further analysis.

Please amend the first full paragraph on page 17, beginning on line 3 as set forth below:

The gateway 42 preferably polls the subsystems when the network is otherwise relatively free, such as late in the day or early in the morning (step 600). The gateway then retains the data returned by the various appliances until a next transmission to the remote center (steps 612, 614).

Please amend paragraph 2, page 17, beginning on line 7 as set forth below:

Referring now to Fig. 7, when the remote center 50 receives a message, the center first determines if the message is an alarm message or a warning message (steps 700, 702, 703). The remote center thus checks the message field in the message header.

Please amend the paragraph that spans page 18, beginning at line 17 through page 19, line 3 as set forth below:

If the appliance is not serviceable, such as a water heater (not shown) with a ruptured tank, the remote center checks its stored user contract information to determine if the user's contract covers appliance replacement (step 720). If so, the remote center informs the user of a need to replace the appliance, and recommends one or more replacement appliances (step 724), based on an analysis of the patterns of use of the appliance, as discussed below with reference to Fig. 9. As appropriate, the remote center also informs the user where he or she may purchase the recommended replacement appliances (step[s] 728[, 730]). If the contract also includes arranging for the replacement of the appliance, the remote center schedules the delivery and installation of the replacement appliance purchased by the user (step [732] 730).

Please amend paragraph 3, page 19, beginning on line 12 as set forth below:

If the service is not one that is generally performed by the user, the remote center 50 consults stored contract information, to determine if the user has a service contract (step 808). If not, the remote center sends a message to the user regarding the required service (step 810), and the user then has to arrange to have the service performed. Otherwise, the system notifies the user of the required service and arranges a service appointment that is

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convenient to both the user and the repairman (step 812). The center also preferably determines if that appliance or any other appliance in the household are in need of additional service and, if possible, arranges for these services to be performed during the same service call (steps 814 and 816).

Please amend the first full paragraph of page 20, beginning on line 5 as set forth below:

Further, the remote center can also predict when an appliance is about to malfunction based on an analysis of the operations of the appliance in comparison with other appliances of the same type in other households that report to the center (step 707). For example, the remote center may recognize in a given appliance an operating characteristic that has preceded a particular failure in other appliances of the same type. The remote center can thus schedule pre-emptive maintenance, to avoid the failure of the given appliance (step 709).

Please amend paragraph 3, page 20, beginning on line 17 as set forth below:

Referring now to Fig. 9, the remote center further analyses the data compiled by the appliances to determine patterns of use for the respective appliances (step 900). The remote center then determines if a particular appliance is being used inefficiently in terms of temperature settings, water settings, detergent quantities, and so forth (steps 902, 904). If so, the center recommends more appropriate temperature and water settings and/or detergent use to the user (step 906). If not, the remote center continues to analyse the data provided by the appliances without making any particular recommendations (step 903).

Please amend paragraph 1, page 21, beginning on line 1 as set forth below:

In the example, the remote center analyses information provided by the intelligent washing machine 18 (Fig. 1 [2]) to determine the size of a given load, the type of fabric included in the wash, the machine settings selected by the user for the wash, i.e., load size, temperature, and wash cycle selection, and amount and type of detergent used, and includes this information in the statistical data that is ultimately sent to the remote center. The remote center then analyses the data to determine if the washing machine is both operating properly and/or being used efficiently (steps 902, 904). In the example, the center checks the fabrics washed and the associated machine settings, and determines that the user is washing delicate fabrics at too high a temperature. The remote center then recommends to the user that he or she wash the delicate fabrics at a lower temperature, to prevent harming the fabric and to save energy (step 906).

In the drawings:

Replace Fig. 1 with the revised Fig. 1 attached hereto.

In the claims:

Please amend the claims and add new claims 27 - 33 as set forth below:

1. A system for servicing household appliances, the system including:

    A. one or more monitoring subsystems associated with the one or more appliances, each monitoring subsystem

        i. monitoring the operations of a given appliance and retaining as functional data information relating to the functioning of the appliance,

ii.   analyzing the functional data and determining if the appliance is [operating properly or] in need of attention to avoid a failure of the appliance, and

iii.   transmitting a message indicating that the appliance requires attention, and

B. a center for receiving the messages sent by the monitoring subsystems, the center contacting [the] one or more users of the associated appliances to inform them of the particular [that the appliances require] attention required by the appliances to avoid failures of the respective appliances.

3.   The system of claim 1 wherein

a. the monitoring subsystem sends the functional data or aggregations of the data to the center; and

b. the center processes the data to determine if one or more of the appliances requires service in addition to the attention required to avoid failure.

4.   The system of claim 3 wherein the center

[i. determines from the received data or messages what attention is required for a given appliance,

ii.] determines, if service is required, whether the user of the one or more appliances has a service contract, [for the appliance,] and

[iii.] arranges service of the respective appliances in accordance with the provisions of the contract, if the user has a service contract.

5.   The system of claim 4 wherein the center further

[iv.] determines, if the service required is preventive maintenance [is required], whether the maintenance is of the type performed by the user or by an appliance service person,

[v.] [determines] arranges, if the maintenance is to be performed by a service person[, whether] and the user has a maintenance contract for

the appliance, [and arranges] maintenance to be performed in accordance with the provisions of the contract, and

[vi.] notifies the user what preventive maintenance is to be done if the maintenance is to be performed by the user.

7. The system of claim 6 wherein

[i.] each monitoring subsystem aggregates the functional data over time into statistical data that relates to the operations of the associated appliance,

[j.] the gateway polls each monitoring subsystem to request the statistical data,

[k.] the gateway transmits the statistical data to the center at predetermined times or when other transmissions are made to the center, and

[l.] the center includes the statistical data in an analysis of the patterns of use and the operations of the appliances.

8. The system of claim 7 wherein the center

[i.] determines if a given appliance should be replaced based on the associated patterns of use,

[ii.] recommends at appropriate times the replacement of the appliance with one or more appliance models that fit the associated pattern of use,

[iii.] determines if the user of the given appliance has a replacement contract, and if so, arranges for the delivery and installation of the replacement appliance model selected by the user.

12. A method for servicing household appliances, the method including the steps of:

A. monitoring the operations of one or more appliances and retaining as functional data information relating to the functioning of the respective appliances;

B. analyzing the functional data at the appliances and determining if the respective appliances are [operating properly or] in need of attention to avoid failures;

C. transmitting to a remote center one or more messages indicating that respective [the] appliances require[s] attention; and

D. from the center contacting the users of the associated appliances to inform them that the respective associated appliances require attention to avoid failure.

13. The method of claim 12 further including the steps of

[a.] transmitting data from the appliances to the center,

[b.] analyzing at the center the data from all of the appliances in the household to determine if one or more appliances requires service in addition to the attention required to avoid failure.

14. The method of claim 13 wherein

[d.] the step of analyzing at the appliance further includes determining if a given appliance requires immediate attention, and

[e.] the step of transmitting one or more messages further includes producing alarm messages when immediate attention is required and producing warning messages when other than immediate attention is required.

15. The method of claim 14 wherein the step of contacting includes

[i. determining from the received messages or an analysis of the data what attention is required for a given appliance,

ii.] determining, if service is required, whether the user of the appliance has a service contract for the appliance, and

[iii.] arranging service in accordance with the provisions of the contract, if the user has a service contract.

16. The method of claim 15 wherein the step of contacting further includes

    [iv.]   determining, if preventive maintenance is required, whether the mainte-nance is performed by the user or an appliance service person,

    [v.]   determining, if the maintenance is to be performed by a service person, whether the user has a maintenance contract for the appliance,

    [vi.]   arranging the maintenance to be performed in accordance with the provi-sions of the contract, and

    [vii.]   notifying the user what preventive maintenance is to be done if the main-tenance is to be performed by the user.

17. The method of claim 13 wherein the steps of transmitting include

    [a.]   transmitting the messages and data over a network to a gateway,

    [b.]   transmitting alarm messages and associated data from the gateway to the center as soon as the messages are received by the gateway, and

    [c.]   retaining warning messages and data at the gateway and transmitting the retained messages at predetermined times or when other transmissions are made to the center.

18. The method of claim 17 wherein

    [i.]   the step of analyzing further includes aggregating the functional data over time into statistical data that relates to the operations of the associated ap-pliance,

    [ii.]   the steps of transmitting further include polling from the gateway to re-quest the statistical data and other data and transmitting the requested data to the center at predetermined times or when other transmissions are made to the center, and

    [iii.]   the method further includes the step of including the statistical data in an analysis of the patterns of use and the operations of the appliances.

19. The method of claim 18 wherein the method further includes the steps of

[iv.]   determining if a given appliance should be replaced based on the analysis of patterns of use,

[v.]   recommending replacement appliance models that fit the associated pattern of use,

[vi.]   determining if the user of the given appliance has a replacement contract, and if so, arranging for the delivery and installation of the replacement appliance model selected by the user.

23.   The method of claim 22 further including the steps of

[i.]   transmitting the functional data to the remote center;

[ii.]   analysing the data at the remote center to determine if the one or more appliances are in need of attention.

24.   A system for servicing household appliances, the system including:

A.   one or more monitoring subsystems associated with the one or more appliances, each monitoring subsystem

i.   monitoring the operations of a given appliance and retaining as functional data information relating to the functioning of the appliance,

ii.   analyzing the functional data and determining if the appliance [is operating properly or] is in need of attention to avoid a failure, and

iii.   transmitting a message indicating that the appliance requires attention and the associated data,

iv.   periodically transmitting the functional data,

B [E].   a [c] center for receiving the messages and the data sent by the monitoring subsystems, the center analyzing the messages and the data and contacting the users of the associated appliances to inform them of the attention required by the respective appliances to avoid failures.

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25.   The system of claim 24 wherein the center analyses the data from all of the appliances in the same household to determine changes in operating environment and uses the results in an analysis of the operations of the various appliance in the same household <u>to determine if attention is required</u>.

26.   The system of claim 24 wherein the center analyses the data from a given type of appliance in the various households that report to the center and uses the results in an analysis of the operations of that type of appliance in each of the households <u>to determine if attention is required</u>.

Please add new claims 27-33 as set forth below:

27. A system for servicing household appliances, the system including:

    C. one or more monitoring subsystems associated with the one or more appliances, each monitoring subsystem

        iv.   monitoring the operations of a given appliance and retaining as functional data information relating to the functioning of the appliance,

        v.   analyzing the functional data and determining if the appliance is in need of attention to avoid a failure of the appliance,

        vi.   setting one or more alarms when user attention is required by the appliance, and

        vii.   transmitting a message indicating that the appliance requires attention if the user does not attend to the appliance within a predetermined time of setting the one or more alarms, and

    D. a center for receiving the messages sent by the monitoring subsystems, the center contacting the users of the associated appliances to inform them of the particular attention required by the given appliance to avoid the failure.

28. The system of claim 27 wherein the center

further analyzes data from the appliances in a given household to determine if the appliance in need of attention requires additional service and if the other appliances require service, and

notifies the user of the additional service required by the given and other appliances.

29. The system of claim 28 wherein the center

further analyzes the data from various appliances in a given household to determine environmental conditions in which the appliances are operating, and

uses the environmental condition information in the analysis of the data from the appliances to determine which, if any, of the appliances requires service to avoid a failure.

30. The system of claim 28 wherein the center further analyses the data from a given appliance in accordance with operating data from other appliances of the same type to determine if the given appliance requires service to avoid a failure.

31. The system of claim 28 wherein the monitoring subsystem, the center or both further analyses the operating data from a given appliance in accordance with historical operating data for the same appliance to determine if the given appliance requires service to avoid a failure.

32. The system of claim 28 wherein the center

determines if the household has a service contract, and

if so, arranges service for the appliances in accordance with the terms of the service contract.